APPLICATION

FOR

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TITLE: PRICE DECISION SUPPORT

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PRICE DECISION SUPPORT

BACKGROUND

This invention relates to price decision support.

5   Price decisions are critical to a distributor of retail merchandise as it seeks to maximize profits within an acceptable level of risk. Price decisions determine the initial prices to set for each item and when and by how much to mark down prices.

SUMMARY

In general, in one aspect, the invention features (1) displaying

10   information about proposed markdowns of retail prices for items of commerce, the proposed markdowns being based on a predefined objective function and on a predefined automatic analysis, (2) enabling the user to cause changes in the automatic analysis, and (3) displaying to the user information about an impact of the

15   changes on metrics associated with the items.

Implementations of the invention may include one or more of the following features. The metrics are sales dollars, gross profit, or time when out of stock will occur. The changes in the automatic analysis include specifying a markdown price in place of a

20   markdown price determined by the automatic analysis. The changes in the automatic analysis include rejecting at least one of the proposed markdowns. The information displayed about proposed markdowns includes the amounts of the markdowns. The information displayed about proposed markdowns includes the

25   costs of the markdowns. The user can control the status of the displaying of the markdowns to permit interaction with the

displayed information prior to committing to executing markdowns. The information about proposed markdowns includes composite information about the total impact of the markdowns. The information about proposed markdowns is displayed at a level

5   selected by the user. The level includes individual items, or items that belong to a style, or subdivisions or division of a commercial operation. The changes in the automatic analysis include changes in the objective function or in rules that govern the analysis. The objective function includes optimizing gross margin dollars while

10   targeting % sell-through by an out-of-stock date. The information about proposed markdowns includes a forecast of financial outcomes by time period with respect to one or more of the items of commerce. The financial outcomes include sales, inventory, or margin. The information about proposed markdowns includes a

15   what-if analysis that predicts financial outcomes based on user indicated markdowns in a succession of time periods. The financial outcomes include sales, inventory, or margin.

In general, in another aspect, the invention features a user interface for a model that predicts optimal markdowns of items of

20   commerce. The user interface includes displayed rows, each row identifying an item or group of items of commerce and showing markdown information for the item or group. The markdown information includes a markdown price and a financial impact of the markdown price. An interactive element enables a user to

25   propose a different markdown price for an item or group of items than one provided automatically by a model. A second interactive element enables a user to select or reject a markdown price for

each of the items or groups of items displayed in the rows. Information is displayed about the aggregate financial impact of the selected markdown prices for the items or groups of items.

Other advantages and features will become apparent from the following description and from the claims.

DESCRIPTION

(Figure 1 shows a screen shot of a Login Screen.

Figure 2 shows a screen shot of a Navigation Bar.

Figure 3 shows a screen shot of a Worksheet Screen.

Figure 4 shows a screen shot of an Edit Columns Screen.

Figure 5 shows a screen shot of a Merchandise Maintenance Screen.

Figure 6 shows a screen shot of a Markdown Summary Screen.

Figure 7 shows a screen shot of a Business Rules Screen.

Figure 8 shows a screen shot of a User Profile Screen.

Figure 9 shows a screen shot of a Change Password Screen.

Figure 10 shows a screen shot of a What if Screen.

Figure 11 shows a screen shot of a User Administration Screen.

Figure 12 shows a screen shot of a Future Forecast Screen)

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The system described here provides an easy-to-use, rich interface that enables a user to observe and manipulate a range of aspects of a model that generates proposed markdown prices for items of commerce. The proposed markdown prices are based on historical

5   information about demand behavior associated with different prices of the items of commerce and desired outdates for the items (that is, the dates on which the retailer wishes to have no remaining inventory of the respective items). Details about an example of such a model are set forth in United States patent application serial

10   number 09/263,979,filed March 5, 1999, and incorporated by reference.

The recommendations for markdown prices generated by the model are conveyed to the user through a graphical user interface. The user can observe and manipulate aspects of the analysis to

15   consider a variety of scenarios.

The interface also enables the user to execute proposed markdowns and modifications of the markdowns suggested by the user. The user can observe recommended markdowns by week during a season, including the current week and future weeks. Users can

20   compare multiple pricing scenarios and can see summarized forecasted financial performance.

The markdown recommendations are generated based also on operational constraints associated with the markdown decisions.

The application may be run as an application service provider ASP (hosted by a central facility and accessed remotely by the client), or deployed as software hosted and run at a client's site.

The recommended markdowns that are displayed to a user for a
5   style of an item of commerce are based on a predefined objective function. The user can specify alterations in the markdowns and can see the impact of the alterations in terms of markdown costs and budget.

The application enables a user to view and work with optimal
10   markdown scenarios for retail items that can be used to support markdown decisions. By markdown decisions, we mean, for example, decisions about permanent price reductions of retail items.

As shown in figure 1, the application is accessed through a web
15   browser. Users enter the application through a login screen 10. Users have unique, case-sensitive login names 12 and passwords 14, which define user-level authorities and permissions. This provides application security.

As shown in figure 2, a Navigation Bar 16 on each screen enables
20   users to access features and components of the application. The features and components are invoked using tabs labeled markdown 18, merchandise 20, business rules 22, and user profile 24.

Invoking the markdown tab or merchandise tab leads to worksheets in which users can take markdowns and manipulate
25   merchandise.

As shown in the markdown worksheet 20 of figure 3, a worksheet displays a set of merchandise data defined at a level of the merchandise hierarchy that has been selected by the client at system configuration (e.g., the level could be vendor or subdivision

5   of vendor).

Each worksheet is further segmented by a level selected by the client at system configuration (e.g., collections of items, individual items). In the examples shown in figure 3, the level is collections of shoe items.

10   The items or collections 22 that appear on a worksheet may vary from week to week, depending on whether they are being recommended by the system for a markdown in a current time period. Items that appear on a worksheet are those that meet the markdown eligibility requirements outlined by the client's business

15   rules and have been determined by the model to be at an optimal time for a specified markdown.

The merchandise data is displayed in columns that include specific information about sales, inventory, and past, current, and future pricing. As shown in figure 3, the columns include a selection

20   column 24, a check-mark column 26 for the user to indicate acceptance of a recommended markdown, a status column 28 that indicates the status of the markdown, a column 30 that shows an id for the item, a style description column 32, a recommended marked-down price column 34, a marked-down price column 36

25   that represents the price to which the item will be marked down, a current price column 38, and a cost of mark down column 40

(which is the product of the number of units of the item and the markdown per unit).

A variety of other columns can also be displayed. The choice of columns to be displayed and the order in which they appear is

5   chosen by the user in a selection screen shown in figure 4. Users can also sort data by any selected column.

A worksheet has a status 42 (figure 3) that tells the user what actions have been performed on that worksheet. Possible worksheet status values include:

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- Not Submitted: A worksheet may or may not have changes indicated, but it has not yet been submitted for approval.
- Submitted: A user has finished creating markdown scenarios and taking markdowns on a worksheet, and
15   has submitted the worksheet for approval.
- Approved: A worksheet that was submitted is approved by a user who has "Approve" access, which means the markdowns that were taken on the worksheet have been accepted. Once approved, the worksheet will be
20   executed at a cutoff time.
- Executed: A worksheet was approved by the cutoff time has been processed, that is, sent to a price file for implementation.

Users can view summary metrics for merchandise data on a

25   particular worksheet for values that they specify at system configuration, including, but not limited to:

- Available markdown budget 44
- Taken markdown dollars 46, which is the price change multiplied by the inventory for all items on Worksheet.
30   This is used only for retail accounting.

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- Variance amount 48, which is the available markdown amount minus the markdown amount taken.
- Number of markdowns taken 50
- Amount of recommended markdowns 52
- Number of recommended markdowns 54
- Number of markdowns changed from the model's recommendation 56
- Worksheet status 42
- The username of the person who last modified the worksheet 58
- The date and time the worksheet was last modified 60

At system configuration, a user can select a hierarchy level (below the level selected for worksheets) to be the smallest unit of merchandise data (e.g., item or collection) displayed in worksheets.

For each unit, which is displayed one to a row on the worksheets, there are columns providing corresponding data for that item.

A user can add or remove the individual units to or from his worksheets though a search and selection in a Collection Maintenance screen shown in figure 5, depending on which data they require to make their markdown decisions. The searching can be done using the drop down boxes 70, 72, and 74 and the individual items can be highlighted and edited or deleted as needed.

Users can also change outdates for units in column 76, which in turn will alter the markdown recommendation for those units the following week. Changing the outdate causes the inventory to be marked down more aggressively or more conservatively depending on which direction the outdate is changed. Lengthening the

outdate can lead to less aggressive markdowns. Shortening the outdate can lead to more aggressive markdowns.

Users can accept markdown recommendations for all units or only for those units that they have selected, or they can accept no

5   markdown recommendations.

Users can also change the prices to which they want to markdown specific units, overriding the model's markdown recommendations.

Users can select a combination of the model's markdown recommendations and their overrides and can view summary

10   information for different markdown scenarios, as shown in figure 3. The summary information displayed includes, but is not limited to the items listed below:

- Status 42 indicates that a worksheet is Not Submitted, Submitted for approval, Approved, or Executed.

15   - Division 35, Entity 37, and Subdivision 39 identify the worksheet and what merchandise can be found in that worksheet.

- Last Modified 60 is the date and time of the last modification to the worksheet.

20   - Modified By 58 is the name of the last user to modify the worksheet.

- Taken MD$ 46 is the total amount of markdowns taken in the worksheet.

- # Taken Markdowns 50 is the total number of markdowns

25   taken in the worksheet.

- # Recommended Markdowns 51 is the total number of recommended markdowns in the worksheet.

- Recommended MD$ (which can be added by user configuration) is the total amount of the recommended markdowns in the worksheet.

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- Planned MD$ (which can be added by user configuration) is the total markdown budget for the current period, in dollars.

- Planned GM% (which can be added by user configuration) is the total planned gross margin percent for the current period.

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- Recommended GM% (which can be added by user configuration) is the total recommended gross margin percent for the current period.

- Planned GM$ (which can be added by user configuration)is the total planned gross margin dollars for the current
15 period.

- Recommended GM$ (which can be added by user configuration) is the total recommended gross margin dollars for the current period.

The Markdown Summary Screen shown in figure 6 provides users

20 with the ability to look at summary metrics across multiple

worksheets. The available metrics include, but are not limited to:

- Status 110 indicates that a worksheet is Not Submitted, Submitted for approval, Approved, or Executed.

- Worksheet ID 112, Division 114, Entity 116, and
25 Subdivision (which can be added by user configuration) identify the worksheet and the merchandise that can be found in that worksheet.

- Last Modified 118 is the date and time of the last modification to the worksheet.

30
- Modified By 120 is the name of the last user to modify the worksheet.

- Taken MD$ 122 is the total amount of markdowns taken in the worksheet.

- \# Taken Markdowns (which can be added by user configuration) is the total number of markdowns taken in the worksheet.

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- \# Recommended Markdowns (which can be added by user configuration) is the total number of items recommended for markdowns this week.

- Recommended MD$ (which can be added by user configuration) is the total amount of the recommended markdowns in the worksheet.

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- Planned MD$ 130 is the total markdown budget for the current period, in dollars.

- Planned GM% (which can be added by user configuration) is the total planned gross margin percent for the current period.

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- Recommended GM% (which can be added by user configuration) is the total recommended gross margin percent for the current period.

- Planned GM$ (which can be added by user configuration) is the total planned gross margin dollars for the current

20
  period.

- Recommended GM$ (which can be added by user configuration) is the total recommended gross margin dollars for the current period.

25 From here, users can also select one or more worksheets to view a recommended forecast summary. A pop-up window (Figure 12) displays the recommended forecast summary metrics by week. Values are the sum of the selected worksheets.

Users can view their Business Rules or the guidelines that they

30 have established around which the model's markdown recommendations are made by invoking the Business Rules tab to reach the page shown in figure 7. These rules determine when items are first eligible for markdowns, how deep the markdowns

can be, how frequently markdowns can occur, what standard pricing is used, how inventory is handled, and any other constraints that affect markdown decisions. In figure 7, each rule or guideline is displayed using a heading 124 and a description 126 of the rule

5   or guideline, displayed under the heading. The particular rule shown as item 126 is often a key objective of the model, namely to optimize gross margin dollars while targeting 100% sell through by the out-of-stock date.

The User Profile screen shown in figure 8 allows users to view a

10 list 180 of the worksheets to which they have access and their permission level 182 for each of those worksheets. The screen shown in figure 9 enables the user to change his password.

Users can export merchandise data from the worksheet screen to an Excel or other delimited file.

15 The User Management screen shown in figure 11 allows client system administrators to manage users.

System administrators can make worksheets available to any user at any of the permission levels shown below. A system administrator can suspend a user by removing all worksheet access

20 from that user. A system administrator can also delete a user.

The permission levels are:

- View-only access allows a user to look at all of the information in a worksheet, but does not allow the user to make any changes to it.

- Submit access allows a user to edit a worksheet and to take markdowns. The user can save these changes, and can submit the worksheet for approval.

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- Approve access allows a user to edit a worksheet, submit it for approval, and approve or decline changes anyone has made to the worksheet.

Future Forecast information is provided at the top of the display shown in figure 10. The Future Forecast table enables the user to

10   see, in respective columns 210 for weekly and monthly periods during a season, the expected MD's, Forecasted Sales and Inventory, and end of life gross margin. By-week data is displayed as a graph and/or a table. This forecast can be viewed for an arbitrary list of items/collections, or rolled up to include the entire

15   worksheet, division, region, or chain, depending on what merchandise a user selects for the forecast. This allows buyers and higher level executives to anticipate MD budget needs and financial performance. This feature also allows users to take all of the recommended markdowns for the current time period.

20   A What-If section shown on the bottom of figure 10 allows the user to input various prices for a group of items/collections that the user selects, and to understand the effect of these changes on MD Cost, Forecasted Sales and Inventory, Future MD's, Inventory at Out of stock, and other metrics. By-week data will be displayed as

25   a graph and/or a table. Users will be able to fully understand the impact of their decisions each week, and predict how these decisions will affect future performance. This feature also allows users to take the markdowns they input for the current time period.

The software may be run using Oracle, Weblogic, and Solaris or Linux or Windows NT or Windows 2000. Microsoft or other SQL servers could be used instead.

The aspects of the system that are client-customizable include:

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- column names (display and database), column ID, column description,
- summary metrics for each worksheet and across worksheets,
- the UI with client name and logo, the values for which
10 are stored in an XML file.

Turning functionality on and off is also semi-configurable.

Other implementations are within the scope of the following claims.